

We claim:

1. A method of fabricating plastic products with integral textured or roughened material, comprising:
 - a) providing a textured or roughened material sheet comprising a textured or roughened layer having a first and a second surface and an ink layer bonded to the second surface of the textured or roughened layer;
 - b) bonding a substrate to the ink layer;
 - c) cutting a piece from the material sheet;
 - d) forming an insert in the configuration of a sleeve;
 - e) positioning the insert in a mold cavity of a plastic molding assembly;
 - f) operating the plastic molding assembly to process a plastic material charge into the mold cavity at a predetermined molding temperature and to form the plastic object; and
 - g) cooling and ejecting the plastic product from the mold cavity;
 - h) in which at least a portion of the substrate bonds to the plastic material charge during the operating of the plastic molding assembly and in which the substrate is adapted for thermally isolating the ink layer during the operating of the plastic molding assembly.
2. The method of claim 1, in which the molding temperature in the range of approximately 150 to 375 Celsius.
3. The method of claim 2, in which the plastic material charge is selected from a group of plastics consisting of polypropylene, styrene, polyethylene, and polyvinyl chloride.
4. The method of claim 1, in which the substrate comprises a material selected from a group of materials consisting of polypropylene, polyester,

polyvinyl chloride, polycarbonate, APET, UV-curable coatings, solvent-based coatings, E-beam-curable coatings, and water-based coatings.

5. The method of claim 1, in which the substrate has a thickness selected from the range of 0.0127 to 0.0762 millimeter.
- 5 6. The method of claim 1, the method further including, prior to the bonding of the substrate, fabricating the substrate by providing a release liner and applying a substrate material to the release liner and in which the bonding of the substrate comprises forcing the ink layer and the substrate material into contact, activating the substrate material with heat and pressure to
10 attach the substrate material to the ink layer, and removing the release liner.
7. The method of claim 1, in which the substrate comprises a coating material and the bonding of the substrate comprises coating the ink layer with the coating material.
8. The method of claim 1, in which the plastic molding assembly is an
15 injection molding machine or a blow molding machine.
9. The method of claim 1, further including concurrently with the operating of the plastic molding assembly, retaining the first surface of the insert in contact with an outer wall of the mold cavity to block flow of the plastic material charge onto the first surface.
- 20 10. The method of claim 9, in which the retaining of the first surface comprises developing a vacuum and applying the vacuum to a portion of the first surface.
11. The method of claim 9, in which the retaining of the first surface comprises developing an electric potential between the outer wall of the mold cavity
25 and a portion of the first surface.

12. The method of claim 9, in which the retaining of the first surface includes attaching raised surface members to an exposed side of the substrate, the raised surface members contacting a center die element in the mold cavity of the plastic molding assembly during the positioning of the insert.
- 5 13. A plastic product fabricated according to the method of claim 1.
14. A method for manufacturing a plastic product with textured or roughened lens material, comprising:
- 10 a) providing a thin textured or roughened insert in the form of a closed-surface sleeve comprising a textured or roughened layer having a first and a second surface and an ink layer bonded to the second surface of the textured or roughened layer;
- b) providing a mold cavity of a plastic molding assembly configured to define the dimensions of the plastic product;
- 15 c) positioning the insert in the mold cavity with the first surface adjacent a wall of the mold cavity;
- d) operating the plastic molding assembly to at least partially fill the mold cavity with liquid plastic, in which the mold cavity and insert being configured such that a frame member is formed along each exposed edge of the insert;
- 20 e) cooling the mold cavity; and
- f) ejecting the hardened plastic product with the insert retained in position by the frame members.
15. The method of claim 14, in which the predetermined distance is less than about 0.06 inches.
- 25 16. The method of claim 14, further including, prior to the positioning of the insert, bonding a substrate to the ink layer, the substrate having a thickness and thermal resistance that in combination prevent the ink layer from damage during the operating of the plastic molding assembly.

17. The method of claim 14, in which at least one frame member extends a predetermined distance onto the first surface.
18. The method of claim 17, further including, prior to the positioning of the insert, forming a beveled edge on the exposed edges of the insert to provide a flow passage for the liquid plastic in the operating step and to define the predetermined distance.
19. A product for displaying images created with textured or roughened material, comprising:
- a) a plastic display surface;
 - b) a closed-surface textured or roughened insert positioned in abutting contact with the display surface, the insert including a textured or roughened layer having a first and a second surface, an ink layer bonded to the second surface of the textured or roughened layer, and a bonding and thermal protection substrate attached to and covering the ink layer; and
 - c) means for retaining the insert in the abutting contact position on the display surface.
20. The product of claim 19, in which the retaining means comprises a bonding interface between the substrate and material of the plastic display surface.
21. The product of claim 20, in which the substrate comprises a material selected from a group of materials consisting of polypropylene, polyester, polyvinyl chloride, polycarbonate, APET, UV-curable coatings, solvent-based coatings, E-beam-curable coatings, and water-based coatings.
22. The product of claim 21, in which the substrate has a thickness selected from the range of 0.0127 to 0.0762 millimeter.

23. The product of claim 19, in which the retaining means comprises frame members connected to the display surface and abuttingly contacting exposed edges of the insert.
24. The product of claim 23, in which the frame members extend a predetermined retention distance onto the first surface adjacent each of the exposed edges.
25. The product of claim 19, in which the product is a container and the display surface is an outer wall of the container.
26. The product of claim 25, in which the insert extends along substantially the entire perimeter of the outer wall such that two side edges of the insert form a seam.
27. A method of fabricating plastic products with integral textured or roughened material, comprising:
- a) providing a closed-surface textured or roughened insert comprising a textured or roughened layer having a first and a second surface, an ink layer bonded to the second surface of the layer, and a substrate bonded to the ink layer;
 - b) positioning the insert in a mold cavity of a plastic molding assembly; and
 - c) operating the plastic molding assembly to process a plastic material charge into the mold cavity at a predetermined molding temperature and to form the plastic object
- in which at least a portion of the substrate bonds to the plastic material charge during the operating of the plastic molding assembly and in which the substrate is adapted for thermally isolating the ink layer during the operating of the plastic molding assembly.
28. The method of claim 27, further comprising cooling and ejecting the plastic product from the mold cavity.

29. The method of claim 27, in which the molding temperature in the range of 150 to 375 Celsius.
30. The method of claim 29, in which the plastic material charge is selected from a group of plastics consisting of polypropylene, styrene, polyethylene, and polyvinyl chloride.
31. The method of claim 27, in which the substrate comprises a material selected from a group of materials consisting of polypropylene, polyester, polyvinyl chloride, polycarbonate, APET, UV-curable coatings, solvent-based coatings, E-beam-curable coatings, and water-based coatings.
32. The method of claim 27, in which the substrate has a thickness selected from the range of 0.0127 to 0.0762 millimeter.
33. The method of claim 27, the method further including, prior to the bonding of the substrate, fabricating the substrate by providing a release liner and applying a substrate material to the release liner and in which the bonding of the substrate comprises forcing the ink layer and the substrate material into contact, activating the substrate material with heat and pressure to attach the substrate material to the ink layer, and removing the release liner.
34. The method of claim 27, in which the substrate comprises a coating material and the bonding of the substrate comprises coating the ink layer with the coating material.
35. The method of claim 27, in which the plastic molding assembly is an injection molding machine or a blow molding machine.
36. The method of claim 27, further including concurrently with the operating of the plastic molding assembly, retaining the first surface of the insert in contact with an outer wall of the mold cavity to block flow of the plastic material charge onto the first surface.

37. The method of claim 36, in which the retaining of the first surface comprises developing a vacuum and applying the vacuum to a portion of the first surface.
- 5 38. The method of claim 36, in which the retaining of the first surface comprises developing an electric potential between the outer wall of the mold cavity and a portion of the first surface.
- 10 39. The method of claim 36, in which the retaining of the first surface includes attaching raised surface members to an exposed side of the substrate, the raised surface members contacting a center die element in the mold cavity of the plastic molding assembly during the positioning of the insert.
40. A plastic product fabricated according to the method of claim 27.
41. A method for manufacturing a plastic product with textured or roughened material, comprising:
- 15 a) providing a thin textured or roughened insert in the form of a closed-surface sleeve comprising a textured or roughened layer having a first and a second surface and an ink layer bonded to the second surface of the textured or roughened layer;
- 20 b) providing a mold cavity of a plastic molding assembly configured to define the dimensions of the plastic product;
- c) positioning the insert in the mold cavity with the first surface adjacent a wall of the mold cavity;
- 25 d) operating the plastic molding assembly to at least partially fill the mold cavity with liquid plastic, in which the mold cavity and insert being configured such that a frame member is formed along each exposed edge of the insert, the insert being retained in position by the frame members.
42. The method of claim 41, further comprising cooling the mold cavity.

43. The method of claim 41, in which at least one frame member extends a predetermined distance onto the first surface.
44. The method of claim 43, in which the predetermined distance is less than about 0.06 inches.
- 5 45. The method of claim 41, further including, prior to the positioning of the insert, bonding a substrate to the ink layer, the substrate having a thickness and thermal resistance that in combination prevent the ink layer from damage during the operating of the plastic molding assembly.
- 10 46. The method of claim 41, further including, prior to the positioning of the insert, forming a beveled edge on the exposed edges of the insert to provide a flow passage for the liquid plastic in the operating step and to define the predetermined distance.
47. A product for displaying images created with textured or roughened lens material, comprising:
- 15 a) a plastic display surface;
- b) a closed-surface textured or roughened sleeve positioned and integrally retained to the plastic display surface, the insert including a textured or roughened layer having a first and a second surface, an ink layer bonded to the second surface of the textured or roughened layer, and a bonding and thermal protection substrate attached to
- 20 the ink layer.
48. The product of claim 47, in which the sleeve is integrally retained to the display surface by a bonding interface between the substrate and the plastic display surface.
- 25 49. The product of claim 47, in which the substrate comprises a material selected from a group of materials consisting of polypropylene, polyester,

polyvinyl chloride, polycarbonate, APET, UV-curable coatings, solvent-based coatings, E-beam-curable coatings, and water-based coatings.

50. The product of claim 47, in which the substrate has a thickness selected from the range of 0.0127 to 0.0762 millimeter.
- 5 51. The product of claim 47, in which the sleeve is integrally retained to the display surface by members connected to the display surface and abuttingly contacting exposed edges of the insert.
52. The product of claim 51, in which the frame members extend a predetermined retention distance onto the first surface adjacent each of the exposed edges.
- 10 53. The product of claim 47, in which the product is a container and the display surface is an outer wall of the container.
54. The product of claim 47, in which the two side edges of the insert form a straight seam.
- 15 55. The product of claim 47, in which the two side edges of the insert form a sinusoidal seam.
56. The product of claim 47, in which the two side edges of the insert form a zig-zag seam.
- 20 57. A product for displaying images created with textured or roughened material, comprising:
- a) a paper display surface;
 - b) a closed-surface textured or roughened insert maintained in position adjacent the paper display surface, the insert including a textured or roughened layer having a first and a second surface, an ink layer
- 25 bonded to the second surface of the textured or roughened layer,

and a bonding and thermal protection substrate attached to the ink layer.

58. The product of claim 57, in which the sleeve is maintained in position adjacent the paper surface by an adhesive between the substrate and the paper display surface.
59. The product of claim 57, in which the substrate comprises a material selected from a group of materials consisting of polypropylene, polyester, polyvinyl chloride, polycarbonate, APET, UV-curable coatings, solvent-based coatings, E-beam-curable coatings, and water-based coatings.
60. The product of claim 57, in which the substrate has a thickness selected from the range of 0.0127 to 0.0762 millimeter.
61. The product of claim 57, in which the product is a container and the display surface is an outer wall of the container.
62. The product of claim 57, in which the two side edges of the insert form a straight seam.
63. The product of claim 57, in which the two side edges of the insert form a sinusoidal seam.
64. The product of claim 57, in which the two side edges of the insert form a zig-zag seam.
65. A product for displaying images created with textured or roughened lens material, comprising:
- a) a closed surface textured or roughened sleeve comprising a textured or roughened layer having a textured or roughened outer surface and a back side, an ink layer bonded to the back side of the textured or roughened layer, and a substrate layer separate from the textured

- or roughened lens layer that is attached to and covering a side of the ink layer opposite the back side of the textured or roughened layer;
- b) a plastic base layer having a recessed region in which the sleeve is located so that the textured or roughened outer surface faces away from the recessed region; and
- c) means for holding the textured or roughened sleeve in the recessed region of the plastic base layer.
66. The product of claim 65, in which the means for holding comprises a bonding interface between a side of the substrate layer not attached to a side of the ink layer and material of the plastic base layer.
67. The product of claim 65, in which the substrate layer comprises a material selected from a group of materials consisting of polypropylene, polyester, polyvinyl chloride, polycarbonate, amorphous polyethylene terephthalate, ultraviolet-curable coatings, solvent-based coatings, electron-beam-curable coatings, and water-based coatings.
68. The product of claim 65, in which the substrate layer has a thickness selected from the range of 0.0127 to 0.0762 millimeter.
69. The product of claim 65, in which the product is a container and at least a portion of the plastic base layer is an outer wall of the container.
70. A plastic product for displaying images created with textured or roughened material, comprising a closed surface textured or roughened sleeve comprising a textured or roughened layer having an outer surface and a back side, an ink layer bonded to the back side of the textured or roughened layer, and a substrate layer separated from the textured or roughened lens layer and attached to and covering the ink layer; and a plastic base layer having a recessed region in which the sleeve is held by an integral bond between the substrate layer and the plastic base layer.

71. A product for displaying images created with textured or roughened lens material, comprising a closed surface textured or roughened sleeve comprising a textured or roughened layer having a textured or roughened outer surface and a back side, an ink layer bonded to the back side of the textured or roughened lens layer, and a substrate layer separate from the textured or roughened lens layer that is attached to the ink layer opposite the back side of the textured or roughened layer so as to provide sufficient thermal protection to prevent alteration of the image by a bond between the substrate layer and a plastic base layer having a recessed region in which the sleeve is located so that the textured or roughened outer surface faces away from the recessed region.
72. In combination, a plastic material and a closed surface textured or roughened sleeve for retention in abutting contact by an integral bond with a recessed region formed in the plastic material, the textured or roughened sleeve comprising a textured or roughened lens layer having an outer surface and a back side, an ink layer bonded to the back side of the textured or roughened layer, and a substrate layer separated from the textured or roughened layer and attached to and covering the ink layer to prevent thermal alteration of the image by the plastic material.
73. An integrally formed closed-surface textured or roughened sleeve, comprising:
- a) an integral laminate having a textured or roughened layer that has an array of features on an outer face, and
 - b) an image layer on an inner face of the textured or roughened layer, the size and number of features being coordinated with the image layer.
74. The sleeve of claim 73, in which the integral laminate further comprises a backing layer having an outer side immediately adjacent an inner side of the image layer.

75. The sleeve of claim 74, in which the outer side of the backing layer is in contact with the inner side of the image layer.
76. The sleeve of claim 74, in which the integral laminate further comprises a protection layer having an outer side immediately adjacent an inner side of the backing layer.
77. The sleeve of claim 76, in which the outer side of the protection layer is in contact with the inner side of the backing layer.
78. The sleeve of claim 76, in which the integral laminate is integrally bonded to a substrate immediately adjacent the inner side of the protection layer.
79. The sleeve of claim 78, in which the substrate is thermally molded plastic in contact with the inner side of the protection layer.
80. The sleeve of claim 78, in which the closed surface is formed by mating sides of the integral laminate that are bonded together by a continuous seam.
81. An integrally formed closed-surface textured or roughened sleeve, comprising:
- a) a textured or roughened layer, comprising a collection of features on an outer face of the textured or roughened layer and having an inner face opposed to the collection of features;
 - b) a clear core layer having an outer face adjacent the inner face of the textured or roughened layer, and having an opposed inner face;
 - c) an outer bonding layer having an outer face adjacent the inner face of the clear core layer, and having an opposed inner face;
 - d) an ink layer having an outer face adjacent the inner face of the outer bonding layer, the ink layer comprising an image, the size and number

- of the features of the textured or roughened layer being coordinated with the image layer, and the image layer having an inner face;
- e) a paper core layer having an outer face adjacent the inner face of the ink layer, and having an opposed outer face; and
- 5 f) an inner bonding layer having an outer face adjacent the inner face of the paper core layer.
82. The sleeve of claim 81, in which the closed surface is formed by mating sides of the integral laminate that are bonded together by continuous seam.
83. A process of manufacturing a textured or roughened product, comprising:
- 10 (a) engraving an extrusion or calendaring embossing cylinder with a reverse of desired textured or roughened features;
- (b) extruding a clear plastic material with the desired textured or roughened features on an A side;
- (c) producing a smooth or matte finish on a B side;
- 15 (d) printing the B side with a reversed image so that the proper image appears through the textured or roughened features when the product is viewed through the A side;
- (e) cutting a part from the material in a desired size;
- (f) inserting the part with the textured or roughened pattern pointing to
- 20 an outside of a mold and the substrate pointing toward an inside of the mold;
- (g) filling the mold with a molten plastic charge into the mold;
- (h) ejecting the part with the textured label as an integral part of the textured or roughened product.
- 25 84. The process of claim 83, further comprising application of a substrate compatible with molten plastic.
85. The process of claim 84, in which the substrate is a film.

- 86. The process of claim 84, in which the substrate is a coating.
- 87. The process of claim 84, in which the substrate is an ink.
- 88. The process of claim 83, in which the part is die cut from the material to modify the texture at the edges of the part.
- 5 89. A product formed by the process of claim 83.